General

Guideline Title

Guideline for safe use of energy-generating devices.

Bibliographic Source(s)

Burlingame BL, Conner RL. Guideline for safe use of energy-generating devices. In: 2016 Guidelines for Perioperative Practice. Denver (CO): Association of periOperative Registered Nurses (AORN); 2016 Sep. p. e49-e76. [183 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Note from the Association of perioperative Registered Nurses (AORN): The original guideline document provides guidance to the perioperative team for the safe use and maintenance of energy-generating devices. The types of energy addressed in this document include electricity delivered as radio-frequency waves, ultrasound, and laser. The devices that generate the energy include electrosurgical units (ESUs), electrocauteries, ultrasonic instruments, and lasers. The energy produced is transferred to the patient by various methods, including monopolar, bipolar, advanced bipolar (e.g., vessel-sealing), and tripolar (e.g., plasma knife) devices; class 3 and class 4 lasers; and ultrasound (e.g., ultrasonic tissue ablation system, phacoemulsification) and argon-enhanced coagulation (AEC) modalities.

I. Precautions should be taken to mitigate the risk for injury to patients and personnel during the use of energy-generating devices.
II. Precautions should be taken to mitigate the risk for injury associated with the use of electrosurgical units and electrosurgical accessories.
III. Precautions should be taken to mitigate the risk for injury associated with the use of electrosurgery during minimally invasive surgery.
IV. A laser safety program should be established for all owned, leased, or borrowed laser equipment in any location where lasers are used (ECRI, 2011; "Z136.3: Safe use of lasers in health care," 2011; "Z136.1: Safe use of lasers," 2014).
V. Precautions should be taken to mitigate the risk for injury associated with the use of a laser (Dhepe, 2009; Hospital eTools, 2016).
VI. Precautions should be taken to mitigate the risk for injury associated with the use of a phacoemulsifier.
VII. Precautions should be taken to mitigate the risk of injury associated with the use of AEC.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Any condition requiring surgical or other invasive procedures with use of energy-generating devices

Guideline Category

Prevention

Risk Assessment

Clinical Specialty

Nursing

Surgery

Intended Users

Advanced Practice Nurses

Hospitals

Nurses

Guideline Objective(s)

- To provide guidance to the perioperative team for the safe use and maintenance of energy-generating devices
- To provide guidance for some elements of surgical fires and electrical safety related to energy-generating devices

Target Population

Patients undergoing surgical and other invasive procedures that require use of energy-generating devices

Interventions and Practices Considered

Safe use and maintenance of energy-generating devices used in the perioperative environment including electrosurgical units (ESUs), electrocauteries, ultrasonic instruments, and lasers

Major Outcomes Considered

- Incidence of patient injury when using devices that generate the energy, such as electrosurgical units (ESUs), electrocauteries, ultrasonic instruments, and lasers
- Risk of injury to health care personnel

Methodology

Methods Used to Collect/Select the Evidence

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Evidence Review

A medical librarian conducted a systematic search of the databases MEDLINE®, CINAHL®, and Scopus® and the Cochrane Database of Systematic Reviews in October 2015. Results were limited to literature published in English from January 2009 through October 2015. The medical librarian also established alerts at the time of the initial search. During the development of the guideline, the lead author requested supplementary searches and additional articles that either did not fit the original search criteria or were discovered during the evidence appraisal process. The results of alerts were considered until February 2016.

The search terms included subject headings and keywords that address precautions and injuries related to the use of electrosurgical and laser devices. Terms for procedures included *electrosurgery, ultrasonic therapy, ultrasonic surgical procedures, diathermy, argon plasma coagulation, electrocoagulation, high-intensity focused ultrasound ablation, endometrial ablation techniques, and laser therapy*. Subject headings and keywords related to precautions included *adverse effects, accident prevention, patient safety, equipment contamination, equipment safety, equipment failure,* and *risk management*. Special attention was paid to terms that would retrieve literature addressing the potential causes and effects of equipment failure and injuries. Such terms included *burns, fires, implantable electronic devices* (e.g., *artificial pacemaker, implanted electrodes, electromagnetic fields*), and *power sources and settings* (e.g., *electric power supplies, grounding, capacitive coupling, electric wiring*). Subject headings and keywords for types of personal protective equipment and occupational hazards also were included.

Excluded were non-peer-reviewed publications, evidence from other disciplines when evidence from the perioperative setting was available, and case reports that did not provide recommendations for preventing injuries related to the use of electrosurgical devices. Editorials, news items, and other brief items were excluded. Lower-level or lower-quality evidence was excluded when higher-level or higher-quality evidence was available.

Number of Source Documents

In total, 725 research and non-research sources of evidence were identified for possible inclusion, and of these, 183 were cited in the original guideline document. See Figure 1 in the original guideline document for a flow diagram of literature search results.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

I: Randomized controlled trial (RCT) or experimental study, systematic review of all RCTs

II: Quasi-experimental study, systematic review of quasi-experimental studies or combination of quasi-experimental and RCTs

III: Non-experimental studies, qualitative studies, systematic review of non-experimental studies, combination of non-experimental, quasi-experimental, and RCTs, or any or all studies are qualitative

IV: Clinical practice guidelines, position or consensus statements

V: Literature review, expert opinion, case report, community standard, clinician experience, consumer experience, organizational experience (quality improvement, financial)

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Articles identified by the search were provided to the project team for evaluation. The team consisted of the lead author and three evidence appraisers. The lead author divided the search results into topics and assigned members of the team to review and critically appraise each article using the Association of periOperative Registered Nurses (AORN) Research or Non-Research Evidence Appraisal Tools as appropriate. The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference in the original guideline document, as applicable.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The collective evidence supporting each intervention within a specific recommendation was summarized and the Association of periOperative Registered Nurses (AORN) Evidence Rating Model (see the "Rating Scheme for the Strength of the Recommendations" field) was used to rate the strength of the evidence. Factors considered in the review of the collective evidence were the quality of the evidence, the quantity of similar evidence on a given topic, and the consistency of evidence supporting a recommendation. The evidence rating is noted in brackets after each intervention in the original guideline document.

Rating Scheme for the Strength of the Recommendations

1: Strong Evidence: Interventions or activities for which effectiveness has been demonstrated by high quality evidence from rigorously-designed studies, meta-analyses, or systematic reviews, or rigorously-developed clinical practice guidelines

- Evidence from a meta-analysis or systematic review of research studies that incorporated evidence appraisal and synthesis of the evidence in the analysis
- Supportive evidence from a single well-conducted randomized controlled trial (RCT)
- Guidelines that are developed by a panel of experts, that derive from an explicit literature search methodology, and include evidence appraisal and synthesis of the evidence

1: Regulatory Requirement: Federal law or regulation

2: High Evidence: Interventions or activities for which effectiveness has been demonstrated by evidence from:

- Good quality systematic review of RCTs
- High quality systematic review in which all studies are quasi-experimental or a combination of RCTs and quasi-experimental studies
- High quality quasi-experimental study
- High quality systematic review in which all studies are non-experimental or include a combination of RCTs, quasi-experimental, and non-experimental studies. Any or all studies may be qualitative.
- High quality non-experimental studies
- High quality qualitative studies
- Good quality clinical practice guideline, consensus or position statement

3: Moderate Evidence: Interventions or activities for which the evidence has been demonstrated by evidence from:

- Good quality systematic review in which all studies are quasi-experimental or a combination of RCTs and quasi-experimental studies
- Good quality quasi-experimental study
- High or good quality literature review, case report, expert opinion, or organizational experience

4: Limited Evidence: Interventions or activities for which there are currently insufficient evidence or evidence of low quality

- Supportive evidence from a poorly conducted research study
- Evidence from non-experimental studies with high potential for bias
- Guidelines developed largely by consensus or expert opinion

- Non-research evidence with insufficient evidence or inconsistent results
- Conflicting evidence, but where the preponderance of the evidence supports the recommendation

5: Benefits Balanced with Harms: Selected interventions or activities for which the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board is of the opinion that the desirable effects of following this recommendation outweigh the harms

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Guideline for Safe Use of Energy-Generating Devices has been approved by the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board. It was presented as a proposed guideline for comments by members and others. The guideline is effective September 1, 2016.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Dhepe N. Minimum standard guidelines of care on requirements for setting up a laser room. Indian J Dermatol Venereol Leprol. 2009;75 (Suppl 2):S101-S110.

ECRI Institute. Laser use and safety. Oper Room Risk Manag. 2011:IA.

Hospital eTools. Surgical suite - use of medical lasers.Washington (DC): Occupational Safety and Health Administration (OSHA); [accessed 2016 Jun 27].

Z136.1: Safe use of lasers. In: ANSI Z136 Standards. Orlando (FL): Laser Institute of America; 2014.

Z136.3: Safe use of lasers in health care. In: ANSI Z136 Standards. Orlando (FL): Laser Institute of America; 2011.

Type of Evidence Supporting the Recommendations

The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference in the original guideline document, as applicable. Also see the original guideline document for the systematic review and discussion of evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Risk of injury to surgical patients and perioperative personnel will be reduced.
- Refer to the original guideline document for additional discussion of potential benefits of specific interventions.

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

- These recommendations represent the Association's official position on questions regarding optimal perioperative nursing practice.
- No attempt has been made to gain consensus among users, manufacturers, and consumers of any material or product.
- Compliance with the Association of periOperative Registered Nurses (AORN) guideline is voluntary.
- AORN's recommendations are intended as achievable and represent what is believed to be an optimal level of patient care within surgical and invasive procedure settings.
- Although they are considered to represent the optimal level of practice, variations in practice settings and clinical situations may limit the degree to which each recommendation can be implemented.
- AORN recognizes the many diverse settings in which perioperative nurses practice; therefore, this guideline is adaptable to all areas where operative or other invasive procedures may be performed.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Mobile Device Resources

Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 Sep

Guideline Developer(s)

Association of periOperative Registered Nurses - Professional Association

Source(s) of Funding

Association of periOperative Registered Nurses (AORN)

Guideline Committee

Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

No financial relationships relevant to the content of this guideline have been disclosed by the authors, planners, peer reviewers, or staff.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available to subscribers from the Association of periOperative Nurses Web (AORN) site .

Print copies: Available for purchase from the AORN Web site .

Availability of Companion Documents

The following is available:

- Evidence table. Guideline for safe use of energy-generating devices. 2016 Sept. 15 p. Available from the Association of periOperative Nurses (AORN) Web site .

Additional implementation tools, including online learning modules, videos and community discussions, are available from the AORN Web site .

Documents related to the evidence rating model, hierarchy of evidence, and expanded appraisal tools are available from the AORN Web site .

In addition, an AORN Guidelines for Perioperative Practice eBook mobile app is available from the AORN Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on March 7, 2017. The information was not verified by the guideline developer.

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